UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,373	10/10/2002	Mark A. Lillis	PES-0075	1008

23462 7590 04/27/2007
CANTOR COLBURN, LLP - PROTON
55 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

EXAMINER	
RUTHKOSKY, MARK	
ART UNIT	PAPER NUMBER
1745	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
2 MONTHS	04/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/065,373
Filing Date: October 10, 2002
Appellant(s): LILLIS, MARK A.

Mark A. Lillis
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 11/6/2006 appealing from the Office action mailed 5/18/2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,036,827	ANDREWS et al.	03/2000
6,006,582	BHANDARI et al.	12/1999
JP 401-066,537	ONO et al.	03/1989

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 11-16 and 21-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andrews et al. (US 6,036,827) in view of Ono et al. (JP 401066537 A), as evidenced by Bhandari et al. (US 6,006,582.)

The instant claims are to a process for operating an electrochemical system, comprising the steps:

-calibrating a hydrogen gas detector by passing a hydrogen-free gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector generates a first signal; flowing a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture; and calibrating the hydrogen gas detector based upon the first and second signals;

-introducing water to an electrolysis cell;

-producing hydrogen;

-separating hydrogen from water in the hydrogen/water separator;

-introducing environmental gas disposed around electrochemical system components to the hydrogen gas detector; and

-determining the hydrogen concentration in the environmental gas.

Andrews et al. (US 6,036,827) teaches a process for operating an electrochemical system by introducing water into an electrolysis cell; producing hydrogen by adding electricity to the electrolysis cell; separating the hydrogen from water using a hydrogen/water separator (col. 7,

lines 30-60); introducing environmental gas disposed around electrochemical system components to a hydrogen gas detector; and determining the hydrogen concentration of the environmental gas (see col. 7, line 30 to col. 8, line 50 and col. 21, line 50 to col. 22, line 10.) The cell generates hydrogen and oxygen. The detector may be internal or external to the system (see col. 21, lines 50-60.) The invention of the reference will inherently pass gasses through a conduit to the hydrogen detector in order to measure the concentration of hydrogen in the gas. The reference teaches that if the detection of hydrogen is found to be at a high concentration, the hydrogen source would be shut down and the hydrogen and the carrier gas would dissipate into the atmosphere (col. 34, lines 1-11; col. 21, line 60 to col. 22, line 15.)

The reference does not teach calibrating the hydrogen gas detector by passing a hydrogen-free gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector generates a first signal, followed by flowing a known quantity of hydrogen gas from the hydrogen/water separator through a second conduit to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture; and calibrating the hydrogen gas detector based upon the first and second signals.

The calibration of a measuring device, such as a detector, is well known in the art for providing an accurate reading by the device. For example, Ono et al. (JP 401066537 A) teaches a method of detecting hydrogen in a hydrogen detector, including the step of calibrating the hydrogen gas detector by passing a known concentration hydrogen-containing reference gas into hydrogen detector, wherein the hydrogen gas detector generates a first signal to determine a correlation between the concentration of hydrogen and an output signal of the hydrogen gas

detector. This is followed by flowing a sample concentration of hydrogen in a non-hydrogen gas through a second conduit (abstract, figure 1) to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture. The concentration of hydrogen is calculated using a calibration curve stored in the device that is derived from known concentrations of hydrogen compared with the output signal of the hydrogen gas detector. The reference does not disclose the method at applied temperatures or pressures thus, the system is considered to be at ambient values. The calibrating system includes a sample gas injector, an air pump, a reference hydrogen-measuring device, a hydrogen gas detector, a measuring cell to give a known quantity of gas for measuring, a gas metering device, various conduits and interfaces, and a data processor (figure 1.)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to calibrate the detector of Andrews by injecting known amounts of gas from the electrolyzer in order to determine that a signal produced by the detector is accurate for the known standard. The detector is then adjusted to give the proper signal if necessary. This is well known for devices such as detectors, scales, sensors and the like. It would have been obvious to one of ordinary skill in the art at the time the invention was made to calibrate the hydrogen gas detector taught by Andrews et al. (US 6,036,827) using the method of calibrating the detector by comparing adjusted output signals based on the known concentration of hydrogen, as taught by Ono et al. (JP 401066537 A), in order to accurately detect the hydrogen concentration in an environmental gas as desired by Andrews. Further, it would be obvious to use various *known* concentrations of hydrogen in order to develop the calibration curve as disclosed in Ono. Introducing a hydrogen-free gas provides a low-end signal value for such a calibration. Using air

as the hydrogen free gas and the low end concentration of hydrogen would have been obvious to the skilled artesian as the baseline value as hydrogen is generally not a component of air. If a hydrogen-free gas produces a signal, this would serve as a baseline for the detector and the signal would be subtracted from the hydrogen sample signal in order to give an accurate measurement.

Further as evidence, the background section of the Bhandari et al. (US 6,006,582) patent teaches hydrogen sensors used for detecting hydrogen gas concentrations in devices. The reference discloses that hydrogen sensors require routine calibration including a clean air calibration in order to determine the proper detection signal based on the materials of the sensor (col. 1, line 64 to col. 2, line18.) Measuring a larger number of known concentration points in the calibration of a detector, including zero hydrogen, or clean air, will give an accurate calibration of the detector over a broad range of concentrations.

The references do not teach flowing a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector; however, Ono teaches that the calibration system for the detector includes a measuring cell. One of ordinary skill in the art would recognize that the source of hydrogen gas in the electrochemical device taught is from the hydrogen generating system of Andrews et al. (US 6,036,827), where hydrogen is collected from a hydrogen/water separator and that the quantity of sample gas would be determined in the measuring device taught in the Ono system in order to provide a known quantity of hydrogen to calibrate the system as taught by Ono. The Ono reference teaches using a gas metering device and a measuring cell to measure the amount of hydrogen from the gas injector (figure 1.)

With regard to claim 13, the background section of the instant specification teaches that coupling hydrogen producing electrolysis cells with fuel cells is well known in the prior art, forming regenerative fuel cells. The background further notes that calibrated hydrogen gas detectors for these systems are also well described. It would be obvious to one of ordinary skill in the art at the time the invention was made to couple the hydrogen and oxygen of the electrolyzer to a fuel cell in order to generate electricity as the coupling of the hydrogen source to a fuel cell is well known in the art to fuel a fuel cell and generate electricity.

With regard to claims 25-27 and 31-32, it would be obvious to one of ordinary skill in the art to recalibrate the hydrogen detector of Andrews in order to provide an accurate reading of the amount of hydrogen in a sample gas. Recalibrating would be obvious to the skilled artesian to reduce the possibility of error in the event that the detector drifts from its proper output (as noted in Ono and Bhandari. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

With regard to claims 30-32, Ono teaches calibrating a hydrogen gas detector by passing an air pumped sample gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector measures a first value; flowing a known quantity of a reference hydrogen gas to the hydrogen gas detector, wherein the hydrogen gas detector measures a second value corresponding to a percentage of the hydrogen gas in the mixture, determining the correlationship of the first and second signals, and calibrating the hydrogen gas detector. Ono teaches a hydrogen source, an oxygen source, a gas metering device, a measuring cell and a data processor, wherein calibrating is performed on the detector. These elements of the system allow for the automation of the system through the data processor. The detector of Ono is in fluid

communication with the system as the sample gas is carried through the detector to determine the concentration of hydrogen in the sample gas. Both Ono and Andrews teach data storage in a processor. Based on the teachings of Andrews and Ono, it would be obvious to combine the elements taught in the reference to include a calibrated detector fluidly connected to the hydrogen source of the invention of Andrews in order to give an accurate measurement of concentration of hydrogen in the sample gas. As the Ono reference gives motivation to provide the structure for introducing gasses from the system to the detector, merely automating the calibration would be obvious over the teachings of the prior art, (See MPEP 2144.04 sections titled "Automating a manual activity" and "Making Integral.") For these reasons, the claims stand rejected.

(10) Response to Arguments

Applicant's arguments have been fully considered but they are not persuasive.

The applicant summarizes the rejection and argues that the Andrews reference cited in the rejection does not teach that the hydrogen detector is calibrated and that there is no motivation to modify the apparatus of Andrews to calibrate the detector. This argument is not persuasive, as the skilled artesian would understand that the calibration of detectors is desired to ensure that the measured readings are accurate. The applicant admits in the background section of the specification that manual calibration of detectors in electrochemical systems has been done in the past, but that there is no teaching of operating an electrochemical system as claimed. Calibrating is standard practice in measuring devices, such as detectors, scales, and sensors, and is noted in the Ono and Bhandari references for giving a proper correlation between the hydrogen gas concentration and the signal of a hydrogen detector.

Applicant further argues that Ono et al. fail to disclose the specific calibration processes as disclosed by Appellants, e.g., passing a hydrogen-free gas to the hydrogen detector, wherein the hydrogen gas detector generates a first signal, flowing a known quantity of hydrogen gas to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture, and calibrating the hydrogen gas detector based upon the first and second signals. As noted in the rejection, the Ono and Bhandari publications are provided as support to show that it would be obvious to modify the invention of Andrews to obtain applicants claimed invention. Ono teaches calibrating a hydrogen gas detector by passing a *sample* gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector measures a first value; flowing a known quantity of a *reference* hydrogen gas to the hydrogen gas detector beforehand, wherein the hydrogen gas detector measures a second value corresponding to a percentage of the hydrogen gas in the mixture; determining the correlationship of the first and second signals, and calibrating the hydrogen gas detector. The concentration of hydrogen is calculated using a calibration curve that corresponds to the output signal of the detector. Further, the background section of the Bhandari et al. (US 6,006,582) patent teaches hydrogen sensors used for detecting hydrogen gas concentrations in devices. The reference discloses that hydrogen sensors require calibration including clean air calibration in order to determine the proper detection and signal based on the materials of the sensor (col. 1, line 64 to col. 2, line18.) Measuring a larger number of known concentration points in the calibration of a detector, including zero hydrogen, or clean air, will give a more accurate calibration of the detector over a broad range of concentrations. A clean air

calibration of the signal will allow for adjustment of the signal due to detector drifting, contamination and the like.

Appellants then note that obviousness is not based upon what an artisan could do or what an artisan may try, but is based upon what an artisan would be motivated to do with an expectation of success. The motivation to modify the detector of Andrews is found in Ono and Bhandari, which teach that calibrating using known concentrations of hydrogen gas including free air, or a zero concentration, gives a more accurate signal. These teachings have been explained in the rejection and offer a clear expectation of success due to the more accurate detector.

In the last paragraph of page 9, the applicant states that Andrews teaches the hydrogen detector placed near the hydrogen delivery system. Andrews et al. (US 6,036,827) teaches a process for operating an electrochemical system by introducing water into an electrolysis cell; producing hydrogen by adding electricity to the electrolysis cell; separating the hydrogen from water using a hydrogen/water separator (col. 7, lines 30-60); introducing environmental gas disposed around electrochemical system components to a hydrogen gas detector; and determining the hydrogen concentration of the environmental gas (see col. 7, line 30 to col. 8, line 50 and col. 21, line 50 to col. 22, line 10.) The detector may be internal or external to the system (see col. 21, lines 50-60.) The invention of the reference will inherently flow gas through a conduit to the hydrogen detector in order to measure the concentration of hydrogen in the gas. The reference teaches that if the detection of hydrogen is found to be at a high concentration, the hydrogen source would be shut down and the hydrogen/carrier gas would dissipate into the atmosphere (col. 34, lines 1-11; col. 21, line 60 to col. 22, line 15.) In response to applicant's

arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). As noted above and in the final rejection, the Ono and Bhandari publications are provided as support to show that it would be obvious to modify the invention of Andrews to obtain applicant's claimed invention. Ono teaches calibrating a hydrogen gas detector by passing a sample gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector measures a first value; flowing a known quantity of a reference hydrogen gas to the hydrogen gas detector beforehand, wherein the hydrogen gas detector measures a second value corresponding to a percentage of the hydrogen gas in the mixture; determining the correlationship of the first and second signals, and calibrating the hydrogen gas detector. Further, the background section of the Bhandari et al. (US 6,006,582) patent teaches hydrogen sensors used for detecting hydrogen gas concentrations in devices. The reference discloses that hydrogen sensors require calibration including clean air calibration in order to determine the proper detection and signal based on the materials of the sensor (col. 1, line 64 to col. 2, line18.)

Applicant argues that a calibrating modification would require a redesigning of the system of Andrews that is not disclosed in the teachings of Ono and Bhandari. Calibration of the detector would not require a redesigning of the system of Andrews that is not disclosed in the teachings of Ono and Bhandari. Andrews teaches an electrolyser as a hydrogen source, a hydrogen gas/water separator that is subsequently connected to the cathode, where the hydrogen is generated and a hydrogen detector. The detector may be internal or external to the system (see Andrews, col. 21, lines 50-60.) The electrolyzer includes hydrogen and oxygen sources that are

used for calibration. Ono teaches using known concentrations of hydrogen to calibrate the detector to give an accurate signal. Bhandari teaches using a clean air sample to give a hydrogen free value for the detector/signal. No modification would be required that is not taught in the references applied in the rejection.

Applicant then argues that by substituting a hydrogen-free gas, as suggested by the Examiner, the intended function of Ono would be defeated because a hydrogen-free gas would produce an extremely small signal (or no signal) in a hydrogen detector and therefore could not be used to determine the "correlationship" between the hydrogen concentration and the magnitude of the output signal of the detector. This is not persuasive because if a hydrogen-free gas would produce a signal, even an extremely small signal, as suggested by applicant, this would serve as a baseline for the detector and this signal would be subtracted from the hydrogen sample signal in order to give an accurate measurement. This is the essence of calibrating. Giving an accurate measurement is, of course, the point of calibrating the detector.

Applicant notes on page 11 of the Appeal Brief that the teachings of Bhandari et al., which are picked carefully out of the background section and relied upon by the examiner, fail to disclose the calibration method as claimed by Appellants. Applicant then argues that the mere fact that a baseline resistance in "clean air" is first established does not motivate an artisan to calibrate the hydrogen detector of Andrews et al. as disclosed by Appellants, to redesign system of Andrews et al., to locate and operate the detector as presently claimed, or to pick and choose elements of Ono et al. to modify Andrews et al. It is argued that a skilled artisan would have no motivation to combine the process of obtaining "the baseline resistance (or conductivity) of the MOS sensor in 'clean air'.., by calibration" with the un-calibrated detector of Andrews et al.

Furthermore, it is argued that, even combined, as discussed above, the Appellants' claims are not obtained. These arguments are not persuasive.

The teachings of Bhandari et al. are quite clear and cannot be ignored because the teachings are disclosed in the background section of the published patent (see col. 2, lines 1-15.) The reference teaches that the baseline conductivity of the metal oxide semiconductor sensor is established in clean air by calibration because when certain toxins contact the sensor, they absorb on the surface of the sensor. The sensor requires frequent calibrations. The detector of Ono is also a semiconductor-type hydrogen detector. From this, the fact that a baseline resistance in "clean air" is first established does indeed motivate an artisan to calibrate a hydrogen detector to give an accurate reading. One of ordinary skill in the art would recognize that calibration of a detector would be beneficial in order to ensure that the detector generates a proper signal.

Appellants further note that the invention includes an electrochemical cell system and process that enables the automation of hydrogen detecting that was not previously available, thus enhancing accuracy and simplifying the system. This argument is also not persuasive. Based on the teachings of Andrews and Ono, it would be obvious to combine the elements taught in the references to include a calibrated detector fluidly connected to the hydrogen source of the invention of Andrews in order to give an accurate measurement of concentration of hydrogen in the sample gas. Ono teaches a hydrogen source, an oxygen source, a gas metering device, a measuring cell and a data processor, wherein calibrating is performed on the detector. These elements of the system allow for the automation of the system through the data processor. As the Ono reference gives motivation to provide the structure for introducing gasses from the system to the detector, merely automating the calibration would be obvious over the teachings of the prior

art, (See MPEP 2144.04 sections titled "Automating a manual activity" and "Making Integral.") MPEP 2144.04 sections titled "Automating a manual activity" and "Making Integral" state that broadly providing an automatic or mechanical means to replace and manual activity, which accomplished the same result, in this case calibrating, is not sufficient to distinguish over the prior art. The applicant admits in the background section of the specification that manual calibration of detectors in electrochemical systems has been done in the past, but there is no teaching of operating an electrochemical system as claimed. It is noted that most of the instant claims do not preclude manual calibration of the detector when coupled with the electrolyzer taught in Andrews.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Mark Ruthkosky
Primary Examiner
Art Unit 1745

Conferees:

Patrick Ryan

JENNIFER MICHENER
QUALITY ASSURANCE SPECIALIST

Jennifer Michener

FIXED - NEEDS TO BE SIGNED BY PAT.

Day : Wednesday
Date: 11-Apr-2007
Time: 11:14

SIRDEV MIS INTRANET

APPEAL CENTER RETURN

Application Number: 10065373 Date: 11-Apr-2007
Examiner: MARK, RUTHKOSKY GAU: 1745

Appeal Document(s) that caused this Return -- *Please check at least one Document type:*

- ☑ Examiner's Answer
- ☐ Supplemental Examiner's Answer
- ☐ IDS
- ☐ Translation of foreign references needed
- ☐ Amendments not entered/considered
- ☐ Affidavits, Declarations, Evidence
- ☐ Artifacts
- ☐ Other

Reason for Return (from Appeal Specialist to Examiner) -- *Please check at least one Message box or enter text:*

- ☐ No Appeal Conference Held
- ☐ Conference initials needed (three)
- ☑ Headings
- ☐ New Ground of Rejection - TC Director signature needed

(256 characters max)

```
section 8 is missing: Evidence Relied Upon, please list the evidence.
ext.21559 D. Brown
```

Print this Form | Send to Examiner

To go back use Back button on your browser toolbar.

Back to PALM | ASSIGNMENT | OASIS Home page

FIXED

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 11-16 and 21-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andrews et al. (US 6,036,827) in view of Ono et al. (JP 401066537 A), as evidenced by Bhandari et al. (US 6,006,582.)